

## **BARGE-MOUNTED CONCRETE MIXING SYSTEM**

### **BACKGROUND OF THE INVENTION**

#### **I. Field of the Invention**

5 The present invention is directed generally to the delivery of mixed concrete products to pour sites, particularly, to the delivery of mixed concrete via water craft or vessel and, more particularly, to an integrated barge-mounted mixing and delivery system.

#### **II. Related Art**

10 It is known to deliver "ready-mixed" concrete from batching plants to job sites on land using vehicle-mounted transit mixers in which the mixed concrete can be off loaded via chutes into forms, buckets or via pumps to pour sites not directly accessible by truck. It is also  
15 known to use a surface platform, which may be floating, to place fresh concrete on the sea floor or other underwater location using piping or similar delivery systems. One such system is illustrated and described by Rail et al in U.S. Patent 4,266,889.

20 Many on shore or off shore pour sites are difficult to access by conventional truck delivery, however. For these, there remains a need to supply freshly mixed concrete at pour sites in a more convenient manner. Access by water would be particularly desirable.

#### **SUMMARY OF THE INVENTION**

25 By means of the present invention, there is provided a floating source of freshly mixed concrete, including a system for mixing and dispensing concrete products which enables on-water access to many pour sites where the  
30 supplied concrete can be off loaded in conjunction with equipment at the site.

In a detailed embodiment used to illustrate the inventive concept, a conventional barge is provided which

may be tug-operated or self-propelled. A pair of large opposed concrete mixing drums are centrally mounted on the barge with facing charge/discharge openings having discharge chute systems which address a common discharge conveyor through a feed hopper which, in turn, delivers mixed open concrete material to an output conveyor from which mixed concrete is delivered to an elevated output chute where is may be off loaded into crane-operated buckets or other off-loading devices. The operation of the system may be controlled remotely from an elevated control room also mounted on the barge.

#### BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, wherein like numerals are utilized to depict like parts throughout the same:

Figure 1 is a plan view of a barge-mounted concrete mixing system in accordance with the invention;

Figure 2 is an elevational view partially in section, taken substantially along lines 2--2 of Figure 1 not including the mixing drum;

Figure 3 is an elevational view partially in section, taken substantially along lines 3--3 of Figure 1;

Figure 4 is a view partially in section, taken substantially along lines 4--4 of Figure 1; and

Figure 5 is an enlarged side elevational view depicting one mixing drum.

#### DETAILED DESCRIPTION

The embodiment illustrated and described in the detailed description of this specification is intended to serve as an example only and is not intended to limit the scope of the inventive concept in any way. The features of the invention may be manifested in a variety of forms and variations which yet remain within the confines of

the intended scope of the invention. With this in mind, a detailed embodiment will next be described.

Figure 1 depicts a top or plan view of one possible arrangement of a barge-mounted concrete mixing system, generally at 10, in accordance with the present invention. The system includes a pair of large opposed mixing drums 12 and 14 of possibly 20 yards or greater capacity mounted on respective mixer bases 13 and 15 to address and discharge mixed material onto a common relatively level discharge conveyor 16 with cover 17 which, in turn, at a head pulley or drive end 18, discharges conveyed material through a further chute 19, on to an inclined product conveyor 20 which has a tail or idler pulley system 22 and a head or drive pulley system 24 as best seen in the elevational view of Figure 3. The upper portion of the conveyor 20 is supported from a raised platform 26. A partial, hinged conveyor cover is shown at 28 and a conveyor take up system for belt tension adjustment is shown at 30.

A rotatable, folding discharge chute system 32 for controlling the off loading distribution of mixed concrete is also mounted from the platform 26. The chute may be provided with a mechanized rotating and unfolding system similar to the discharge chutes from the opposed mixing drums as will be described in greater detail in conjunction with Figure 5. Such systems are known to those in the art and may include manual and automatic control drives, clutches and locking mechanisms.

A variety of additive totes or bins are shown at 34 mounted on the deck of the barge to provide additives for concrete batches as needed. Automated or manual access may be provided. A generator is depicted at 36. Also shown in Figure 1 as being above deck are a recycle or a

gray water sump 38 with a recycle water basket strainer 40 (Figure 4). Also in Figure 4, an access or service ladder is shown at 42. A gray water storage tank is shown at 44 in Figure 1 along with a large tool shed 45 and a portable restroom facility 46. Also, below deck, fuel storage tank 48 and potable water storage tank 49 are shown in broken lines. A large liquid nitrogen storage tank is shown at 47. Liquid nitrogen is used for cooling fresh concrete if necessary.

An elevated control room 50 is provided from which the operation of the barge-mounted mixing system may be observed and centrally controlled. The various motors, pumps, valve, cylinders, etc., of the process are preferably integrated and sequenced using as much automatic control as is practical. The control room is provided with accesses in the form of a pair of opposed stairways 52, 54 (Figure 1). The control room is mounted on an elevated platform 56.

As best seen in Figures 2 and 5, the mixing drums 12 and 14 are mounted for rotation in a conventional manner supported by respective drive and support pedestals 60 and 62 and loading/discharge pedestal 64 and 66. The drums are provided with loading or charging chutes at 68 and 70 and rotating and folding mechanized discharge chute systems at 72, 74. As best seen in Figure 2, conveyor feed hopper 76 is provided above the conveyor 16 and a drip pan 78 which drains into the gray water sump 38 at 79 (Figure 4). The conveyor feed hopper 76 is accessible to the discharge chute systems with the chute systems in the folded configuration as shown in the figures.

As best seen in Figure 5, and with reference to mixing drum 12, it being understood that mixing drum 14

is provided with identical operative parts, each mixing discharge system includes folding chute segments 80, 82 hinged at 84 and a chute drive or rotating system including a hydraulic cylinder 86 and operating pivot arm 5 88 which rotates a shaft 90 connected to a lockable pivot gear 92 in a well known manner. It should be understood that other systems such as hydraulic motors, or the like, can be used to operate the rotating chutes. Manual and/or automatic position locking devices and clutch 10 release systems may also be provided. Such a system is illustrated and described in greater detail in U.S. Patent 6,578,694 B2 to Harris et al, incorporated herein by reference for any purpose. An initial discharge chute section is shown at 94 which leads into the folding 15 chutes 80, 82. A power unit is provided for each mixer at 96 and a hydraulic fluid storage tank is shown at 98.

As seen in Figure 2, the barge is provided with a hand rail 100 which extends about the periphery of the deck. All platforms and stairways are also suitably 20 provided with safety grating and hand rails.

As can best be seen in Figure 4, note that the chute of mixer 12 is unfolded and rotated so that it now drains into the gray water sump 38. This posture, of course, is one used during a cleanout cycle for the mixing drum. 25 The discharge chute system of drum 14 is similarly situated for cleanout.

In operation, ingredients to be mixed are loaded from a batching plant by equipment such as cantilevered conveyors, not situated on the barge, but which overhang 30 the barge where it is pulled alongside into the drums for mixing including Portland cement, aggregate and water and any additives desired for a particular batch. Common additives may be kept in the additive totes or bins 34

which may be conveniently connected with the charging  
hoppers via hoses and pumps or the additives desired may  
be apportioned from the bins or totes and added by  
directly dumping into the charging chutes. After  
5 sufficient mixing takes place while the barge is  
positioning itself or being positioned at the desired  
location with relation to the pour site, the mixed drum  
load or loads can be discharged onto conveyor 16 and, in  
turn, conveyor 20 and thereafter off loaded using the  
10 chute system 32 in a well known manner.

An aspect of the invention previously mentioned,  
lies in the fact that control of the mixing and discharge  
of the materials and other operations can be conducted  
remotely from the control room utilizing remote cameras  
15 and a common central control system. It should further  
be realized that the batches in the batch and drum 12 may  
or may not match the batch in drum 14 and they can be  
discharged simultaneously or sequentially under the  
control of an operator. Thus, if desired, two different  
20 mixes of concrete can be provided at the job site for  
sequential pouring. Also, while the drums 12 and 14 are  
shown in an opposed back-to-back arrangement. Other  
arrangements including side-by-side could be used keeping  
in mind the load balancing and other concerns of the  
25 vessel and loading and distribution systems.

This invention has been described herein in  
considerable detail in order to comply with the patent  
statutes and to provide those skilled in the art with the  
information needed to apply the novel principles and to  
30 construct and use such specialized components as are  
required. However, it is to be understood that the  
invention can be carried out by specifically different  
equipment and devices, and that various modifications,

both as to the equipment and operating procedures, can be accomplished without departing from the scope of the invention itself.

What is claimed is: